

February 2018 ~ Resource #340204

## Biotin and Labs

The recommended daily intake of biotin (also known as coenzyme R, vitamin H, or vitamin B7) for most people is 30 **mcg/day**.<sup>14</sup> Supplementation is usually not needed as biotin is found in many foods (e.g., almonds, eggs, beef, pork, salmon, sweet potatoes, sunflower seeds).<sup>14</sup> Despite a lack of strong evidence, some patients take biotin supplements for hair, nail, and skin benefits. In addition, early evidence suggests that extremely high doses of biotin, sometimes referred to as mega doses, might be useful for an anti-inflammatory effect in multiple sclerosis (e.g., 300 mg/day).<sup>15</sup> Since biotin intake may interfere with certain lab test results, it is important to know if patients are taking biotin, especially high doses. **Ask patients about biotin intake, including supplements.** Biotin doses in standard multivitamin preparations (~30 mcg) are unlikely to impact lab tests.<sup>3</sup> However, supplements can have up to 650 times the recommended daily intake of biotin.<sup>13</sup> **Not all tests are affected by biotin, and can vary from manufacturer to manufacturer.** In some tests, biotin may block the assay signal, leading to falsely elevated test results.<sup>14</sup> In other tests biotin may compete with biotin-containing complexes in the assay, leading to falsely low test results.<sup>14</sup> **Ask the lab to provide details about tests they use that can be affected by biotin supplementation.** The timing of lab work for patients who take biotin is determined by how fast biotin is cleared from the body. The biotin elimination half-life will depend on the dose (higher doses take longer to be removed from the body) and duration of use. For example, a patient taking biotin 30 **mg** or more per day may need to stop biotin for several days before blood work for some assays.<sup>14</sup> Because most of these data come from case reports and small studies it is difficult to establish specific guidance. When details are not available, consider the following as a starting point.

- For non-urgent tests, to be on the safe side, wait at least three days after the last dose of biotin before obtaining samples for testing.<sup>14,20</sup>
  - Note that some tests may only require an eight-hour interval between the last biotin dose and obtaining the sample.<sup>7</sup>
- For urgent tests proceed with the test. Contact the lab or test company to determine the potential for biotin interference, especially for results that are not consistent with symptoms.<sup>16</sup>

**\*\*Intervals between the last biotin dose and lab sample vary among assays used.**

**Use this as information only and contact your lab to determine appropriate intervals at your facility. This list is not all inclusive.\*\***

Laboratory Test	Effect of Biotin/Pertinent Information
<b>Beta human chorionic gonadotropin (beta-hCG), quantitative</b>	<ul style="list-style-type: none"><li>• Biotin may falsely lower beta-hCG levels, affecting the results of pregnancy tests.<sup>18,19</sup></li><li>• Some data suggest that patients should be instructed to avoid biotin for at least 12 to 48 hours prior to having beta-hCG levels drawn.<sup>18,19</sup></li></ul>
<b>Cortisol</b>	<ul style="list-style-type: none"><li>• Biotin doses of &gt;5 mg/day may falsely affect results of cortisol levels.<sup>17</sup></li><li>• Some data suggest that patients should be instructed to avoid taking biotin for at least eight hours prior to having cortisol levels drawn.<sup>17</sup></li></ul>

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Laboratory Test	Effect of Biotin/Pertinent Information
<b>Creatine kinase, MB (CK-MB)</b>	<ul style="list-style-type: none"> <li>• Biotin doses of &gt;5 mg/day may falsely lower CK-MB levels.<sup>20,21,25</sup></li> <li>• Some assays are affected with serum biotin levels of 30 mcg/L.<sup>25</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for at least 72 hours prior to having CK-MB levels drawn.<sup>20</sup></li> </ul>
<b>DHEA sulfate (DHEA-S)</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day may falsely <u>increase</u> DHEA-S levels using biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Biotin doses of 300 mg/day may falsely <u>lower</u> DHEA-S levels using sandwich biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for 72 hours prior to having DHEA-S levels drawn.<sup>3</sup></li> </ul>
<b>Estradiol</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can falsely increase estradiol levels using biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some assays are affected with serum biotin levels of 400 mcg/L.<sup>22</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for 72 hours prior to having estradiol levels drawn.<sup>3</sup></li> </ul>
<b>Folate</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely increase folate levels using competitive biotin-streptavidin capture assays.<sup>2</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for at least eight hours prior to having folate levels drawn.<sup>4</sup></li> </ul>
<b>Follicle stimulating hormone (FSH)</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can falsely lower FSH levels using sandwich biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for 72 hours prior to having FSH levels drawn.<sup>3</sup></li> </ul>
<b>Growth hormone</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely lower growth hormone levels using sandwich biotin-streptavidin capture assays.<sup>2</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for at least eight hours prior to having growth hormone levels drawn.<sup>4</sup></li> </ul>
<b>Insulin</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely lower insulin levels using sandwich biotin-streptavidin capture assays.<sup>2</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for at least eight hours prior to having insulin levels drawn.<sup>4</sup></li> </ul>
<b>Luteinizing hormone</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can falsely lower luteinizing hormone levels using sandwich biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some data suggest that patients should be instructed to avoid high doses of biotin for 72 hours prior to having luteinizing hormone levels drawn.<sup>4</sup></li> </ul>

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Laboratory Test	Effect of Biotin/Pertinent Information
<b>Myoglobin</b>	<ul style="list-style-type: none"> <li>• Biotin doses of &gt;5 mg can falsely lower myoglobin levels.<sup>23</sup></li> <li>• Some assays are affected with serum biotin levels of 50 mcg/L.<sup>23</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for at least 72 hours prior to having myoglobin levels drawn.<sup>20</sup></li> </ul>
<b>N-terminal prohormone of brain natriuretic peptide (NT-proBNP or proBNP)</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely lower proBNP levels.<sup>22</sup></li> <li>• Some assays are affected with serum biotin levels of 30 mcg/L while others at 400 mcg/L.<sup>22,24</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for at least 72 hours prior to having NT-proBNP levels drawn.<sup>20</sup></li> </ul>
<b>Parathyroid hormone</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 1.5 to 300 mg daily can falsely lower parathyroid hormone levels using sandwich biotin-streptavidin capture assays.<sup>2,3,5</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking these doses of biotin for 72 hours prior to having parathyroid hormone levels drawn.<sup>4</sup></li> </ul>
<b>Procalcitonin</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely lower procalcitonin levels.<sup>26</sup></li> <li>• Some assays are affected with serum biotin levels of 30 mcg/L.<sup>20</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for at least 72 hours prior to having procalcitonin levels drawn.<sup>20</sup></li> </ul>
<b>Progesterone</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can falsely increase progesterone levels using competitive biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some assays are affected with serum biotin levels of 400 mcg/L.<sup>22</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking high doses of biotin for 72 hours prior to having progesterone levels drawn.<sup>4,20</sup></li> </ul>
<b>Prolactin</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely lower prolactin levels using sandwich biotin-streptavidin capture assays.<sup>2</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for at least eight hours prior to having prolactin levels drawn.<sup>4</sup></li> </ul>
<b>Prostate specific antigen (PSA)</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can cause falsely lower PSA levels using sandwich biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking high doses of biotin for 72 hours prior to having PSA levels drawn.<sup>4</sup></li> </ul>

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Laboratory Test	Effect of Biotin/Pertinent Information
<b>Sex hormone-binding globulin (SHBG)</b>	<ul style="list-style-type: none"> <li>• Biotin may falsely lower SHBG levels using sandwich biotin-streptavidin capture assays.<sup>2</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for eight hours prior to having SHBG levels drawn.<sup>4</sup></li> </ul>
<b>Testosterone</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can falsely increase testosterone levels using competitive biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking high doses of biotin for 72 hours prior to having testosterone levels drawn.<sup>4</sup></li> </ul>
<b>Thyroid stimulating hormone (TSH)</b>	<ul style="list-style-type: none"> <li>• Biotin doses as low as 10 mg/day can falsely lower TSH levels in infants and young children.<sup>1,6,7</sup></li> <li>• Biotin serum concentrations of 25 mcg/L or higher can falsely lower TSH levels.<sup>7</sup></li> <li>• Biotin doses of 300 mg/day can falsely lower TSH levels in adults.<sup>2,8,9</sup></li> <li>• Biotin doses of 10 mg/day may falsely lower TSH levels in adults, although these levels may still fall within the TSH reference range and therefore not be considered clinically significant.<sup>10</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin doses &gt;5 mg for at least eight hours prior to having TSH levels drawn.<sup>3,7</sup></li> </ul>
<b>Thyrotropin receptor antibody (TRAb)/Thyrotropin binding inhibiting antibody (TBIAb)</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 2 to 15 mg/kg/day can falsely increase TRAb levels using biotin-streptavidin capture assays in infants and young children.<sup>1</sup></li> <li>• Biotin doses of 1 to 10 mg/kg/day or 300 mg/day can falsely increase TRAb levels using biotin-streptavidin capture assays in adults.<sup>2,11</sup></li> <li>• Biotin doses of 300 mg/day can falsely increase TBIAb levels using Roche Elecsys assays.<sup>9</sup></li> <li>• Falsely elevated TRAb and TBIAb levels can lead to a misdiagnosis of Graves' disease.<sup>1,2,9,11</sup></li> </ul>
<b>Thyroxine (T4)</b>	<ul style="list-style-type: none"> <li>• Biotin doses as low as 5 to 10 mg/day can falsely increase free thyroxine levels using biotin-streptavidin capture assays in adults and children.<sup>1,2,6-12</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin doses &gt;5 mg for at least eight hours prior to having free thyroxin levels drawn using biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Biotin does not appear to affect free thyroxine levels when assays that do not use biotin-streptavidin capture are used (e.g., Abbott Architect I-2000 analyzer).<sup>11</sup></li> </ul>
<b>Triiodothyronine (T3)</b> <i>Continued...</i>	<ul style="list-style-type: none"> <li>• Biotin doses as low as 5 to 10 mg/day can falsely increase free triiodothyronine levels using biotin streptavidin capture assays in infants and young children.<sup>1,7,12</sup></li> <li>• Biotin doses as low as 10 mg can falsely increase free triiodothyronine levels in adults, although these levels may</li> </ul>

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Laboratory Test	Effect of Biotin/Pertinent Information
<b>T3, continued</b>	<p>still be within the triiodothyronine reference range and therefore not considered clinically significant.<sup>10</sup></p> <ul style="list-style-type: none"> <li>• Biotin doses of 1 to 10 mg/kg/day or 300 mg/day may cause clinically significant falsely high readings in adults. Two cases of falsely elevated free triiodothyronine levels have been reported for an adult patient taking biotin 100 mg three times daily.<sup>2,9,11</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin doses &gt;5 mg for at least eight hours prior to having free triiodothyronine levels drawn that use biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Biotin does not appear to affect free triiodothyronine levels when assays that do not use biotin-streptavidin capture are used (e.g., Abbott Architect I-2000 analyzer).<sup>11</sup></li> </ul>
<b>Troponin</b>	<ul style="list-style-type: none"> <li>• Taking high doses of biotin can cause false-low troponin levels on immunoassays that use biotin interference.<sup>13</sup></li> <li>• Some assays are affected with serum biotin levels of 400 mcg/L.<sup>22</sup></li> <li>• A missed fatal myocardial infarction diagnosis due to falsely low troponin levels has been reported in a patient who was taking high doses of biotin.<sup>13</sup></li> </ul>
<b>Vitamin B12</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day can falsely increase vitamin B12 levels using competitive biotin-streptavidin capture assays.<sup>2,3</sup></li> <li>• Some data suggest that patients should be instructed to avoid taking biotin for 72 hours prior to having vitamin B12 levels drawn.<sup>4</sup></li> </ul>
<b>Vitamin D (25-hydroxyvitamin D [25OHD])</b>	<ul style="list-style-type: none"> <li>• Biotin doses of 300 mg/day may falsely increase 25OHD levels using biotin-streptavidin capture assays.<sup>1</sup></li> </ul>

*Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to having making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.*

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**Project Leader in preparation of this clinical resource (340204): Beth Bryant, Pharm.D., BCPS**

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**Cite this document as follows: Clinical Resource, Biotin and Labs. Pharmacist's Letter/Prescriber's Letter. February 2018.**


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